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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,367	08/31/2001	Kevin Hunter	500893.01	2110

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Kimton N. Eng, Esq.
DORSEY & WHITNEY LLP
1420 Fifth Avenue, Suite 3400
Seattle, WA 98101

EXAMINER	
HAVAN, THU THAO	
ART UNIT	**PAPER NUMBER**
2672	7

DATE MAILED: 03/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/945,367	HUNTER, KEVIN	
	Examiner	Art Unit	
	Thu-Thao Havan	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4-6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Examiner approved the drawing filed on August 31, 2001.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims **1-36** are rejected under 35 U.S.C. 102(e) as being unpatentable by Zhu (US patent no. 6,697,063).

Re claim **1**, Zhu teaches a method for calculating values for pixels of an image of an environment represented by geometric primitives that are defined by geometric data (col. 3, lines 53-59), the method comprising transforming the geometric primitives from a first coordinate space to a second coordinate space (fig. 13), shifting a transformed primitive by a first sub-pixel offset rendering the shifted primitive to generate values for pixels of a first intermediate image shifting the transformed primitive by a second sub-pixel offset (col. 6, lines 2-50), rendering the shifted primitive to generate values for pixels of a second intermediate image (col. 34, line 50 to col. 36, line 3), and combining the values for the respective pixels of the first and second intermediate images to determine the values for the pixels of the image (col. 5, lines 45-67). In other words,

Zhu teaches geometry processing in graphics applications is performed using floating-point arithmetic. Since floating-point arithmetic requires much more hardware to implement than fixed-point arithmetic, they are calculated in fixed-point arithmetic instead. For example, eye-space z's can be calculated as indices to look up fog tables stored as textures. All polygon attributes (or parameters) can be treated in exactly the same fashion with the exception of screen z's. The above observation validates the idea of pushing for a single super-pipeline for computing per-pixel parameters. If data can be moved fast enough through this super-pipeline without starving the downstream hardware, then there is no need to replicate (nearly) identical hardware units. Furthermore, he teaches a double-z method that decouples pixel shading rate from scan conversion and z-buffer rate. In that a pixel is a unit area of the frame, and a fragment is the intersection of a primitive with a pixel. Assuming that a frame of geometries has been transformed into screen space and buffered, the double-z algorithm relies on a scan/z engine that generates visibility through two passes. The first pass generates the depth information in a depth buffer by scan converting primitives and interpolating/comparing/storing depths per pixel using only screen x, y, z coordinates in the primitive forms such as points, line, triangles, strips/fans. Neither rasterization for other surface parameters nor shading/blending computation is performed. The second pass uses the depth-buffer generated by the previous pass, scan converts primitives using screen x, y, z coordinates again, and outputs fragments with screen depths less than or equal to the depths in the depth buffer. These fragments contain pixel locations and corresponding coverage masks. These fragments

correspond to the visible fragments. Further, based on if a primitive generates any visible fragment, the visibility information with respect to entire primitives can also be output.

Re claims **2, 15-17, 19, and 25-26**, Zhu discloses writing the values for pixels of the first intermediate image to a first buffer and writing the values for pixels of the second intermediate image to a second buffer (col. 11, line 63 to col. 12, line 55).

Re claims **3, 20, 27, and 34**, Zhu discloses a z-buffer (col. 6, line 56; fig. 2—element 205). A z-buffer is implemented in the anti-aliasing system of Zhu.

Re claims **4 and 30**, Zhu discloses a strip of connected triangles (figs. 5-elements 501 and 505).

Re claims **5 and 31**, Zhu discloses a fan shaped set of connected triangles (col. 1, lines 29-31; fig. 1). In figure 1, element 103 illustrates a fan shaped set of connected triangles.

Re claims **6 and 32**, Zhu discloses a set of disjoint triangles (col. 2, lines 48-50; figs. 3, 10, and 1—elements 101 and 102). Zhu discloses disjoint triangles

Re claims **7, 11-12, and 23**, Zhu discloses shifting the transformed primitive by the first sub-pixel offset comprises shifting the transformed primitive to a sub-pixel location corresponding to a first sampling location of a sampling pattern (fig. 13). In figure 13, Zhu discloses geometry processing is substantially limited to geometry transformation, normal transformation, texture coordinate generation and transformation.

Re claims **8, 13, 21, 28, and 35**, Zhu discloses averaging the values for the respective pixels from the first and second intermediate images (col. 6, lines 35-50; col. 28, lines 1-24). In other words, Zhu discloses the bandwidth goes down when the average vertex size decreases. In addition, the bandwidth number goes down as the average triangle size becomes smaller, because a tile can now contain longer strips, and the likelihood of triangle duplication in multiple tiles due to tile border crossing is reduced. The asymptotic rate approaches 40.about.50 Mbytes per 1M triangles as the average triangle size is reduced to less than 10 pixels.

Re claims **9, 14, 22, 29, and 36**, Zhu discloses weighting the values as a function of the respective offsets and combining the weighted values (figs. 19-20). Zhu teaches the blending engine combines colors of all subsamples under multi-sample z-buffer anti-aliasing using a standard box filter to generate a final color for each pixel. Under fragment A-buffer anti-aliasing, it combines colors at all fragments at a pixel in either front-to-back or back-to-front order weighted by actual fragment coverage.

Re claims **10, 18, 24, and 33**, the limitation of claims 10, 18, 24, and 33 are identical to claim 1 above. Therefore, claims 10, 18, 24, and 33 are treated with respect to grounds as set forth for claim 1 above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Naegle et al., US patent no. 6,650,323

Deering et al., US patent no. 6,496,187

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thu-Thao Havan whose telephone number is (703) 308-7062. The examiner can normally be reached on Monday to Thursday from 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on (703) 305-4713.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Thu-Thao Havan
Art Unit: 2672
March 17, 2004

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600